

What Is Claimed Is:

1. A method for interpolating at least two position-dependent, periodic analog signals that are phase-shifted with respect to one another, which are generated by scanning a measuring scale, in which
  - the analog signals are each converted into a digital data stream using a sigma-delta modulator,
  - for the generation of a string of results, the data streams are combined with correctional factors and subsequently are combined with one another, and
  - from the string of results, there are created, on the one hand, with the aid of a quality criterion that is to be satisfied during the interpolation, new correctional values, and, on the other hand, the output signals of the interpolation,wherein the values of the string of results (d) for generating the correctional values (k1, k2) as well as the output signals (w) are accumulated over a specifiable time interval; and the signal sequence (a), generated by the accumulation, is used directly as an address sequence for generating the correctional values (k1, k2) and for generating the output signal (w).
2. The method as recited in Claim 1, wherein the values of the string of results (d) are accumulated in a filter (9).
3. The method as recited in Claim 2, wherein an integrator is used as the filter (9).
4. The method as recited in one of the preceding claims, wherein an address sequence (a) is formed by the accumulation whose address values represent the phase information of the analog signals (a1, a2).
5. The method as recited in Claim 4, wherein from the address sequence (a), the output signals (w) of the

interpolation are generated by low-pass filtering and assignment of the address values.

6. The method as recited in Claim 4 or 5, wherein the address values are a linear function of the phase of the periodic analog signals (a1, a2) when the quality criterion is satisfied.
7. The method as recited in one of the preceding claims, wherein the address values of the address sequence (a) represent a phase value having a fractional proportion.
8. The method as recited in Claim 7, wherein the high-value part of the address sequence (a) is used for generating the correctional values (k1, k2), and it corresponds to an integral proportion of the address values.
9. The method as recited in Claim 7 or 8, wherein the high-value part and the low-value part of the address sequence (a) is used for generating the output signals (w) of the interpolation, the latter corresponding to the fractional proportion of the address values.
10. The method as recited in one of the preceding claims, wherein the determination of the output signals (w) of the interpolation is made recursively, in that, in the light of the quality criterion, new correctional values (k1, k2) are generated and combined with the data streams (s1, s2) until the quality criterion is satisfied.
11. The method as recited in one of the preceding claims, wherein the possible correctional values (k1, k2) are stored as predefined values in an assignment unit (4).
12. The method as recited in Claim 11, wherein the correctional values (k1, k2) that are to be combined respectively with the data of the digital data streams

(s1, s2) are selected, in the light of the quality criterion, as a function of the address values of the address sequence (a).

13. The method as recited in one of the preceding claims, wherein the correctional values (k1, k2) are defined as values of a trigonometric function.
14. The method as recited in one of the preceding claims, wherein the at least two analog signals (a1, a2) are phase-shifted by  $90^\circ$  with respect to each other.
15. The method as recited in one of the preceding claims, wherein the analog signals (a1, a2) are essentially sinusoidal.
16. The method as recited in one of the preceding claims, wherein the individual data of the data streams (s1, s2) are respectively combined multiplicatively with a correctional factor (k1, k2); and the data of different data streams are subsequently combined with one another by addition or subtraction.
17. The method as recited in one of the preceding claims, wherein the individual data of the digital data streams (s1, s2) each have a word width of one bit.
18. The method as recited in Claims 16 and 17, wherein the combining of two data of the digital data streams (s1, s2) with the correctional factors (k1, k2) and with each other is reduced to an additive or subtractive combination of two correctional values.
19. The method as recited in Claim 18, wherein the combination is combined to one of four possibilities of the combination of the correctional values (k1, k2) by addition or subtraction.

20. A device for interpolating at least two position-dependent, periodic analog signals that are phase-shifted with respect to each other, which were generated by scanning a measuring scale, having
- a sigma-delta modulator for converting the analog signals to respectively one digital data stream,
  - an arithmetic unit for generating a string of results by combining the data streams with correctional factors as well as by the subsequent combination of the data streams with one another and
  - means, by the use of which, from the string of results, there are created, on the one hand, new correctional values with the aid of a quality criterion that is to be satisfied during the interpolation, and, on the other hand, the output signals of the interpolation,
- characterized by a filter (9), for accumulating the values of the string of results (d) over a specified time interval for generating an address sequence (a), which, on the one hand, controls the arithmetic unit (5) in such a way that the string of results (d) is guided to satisfying a quality criterion, and which, on the other hand, has post-connected to it an evaluation circuit (10) that converts the address values of the address sequence (a) into output values (w) of the interpolation.